(12) UK Patent Application (19) GB (11) 2 268 480 (13) A

(43) Date of A Publication 12.01.1994

(21) Application No 9313389.0

(22) Date of Filing 29.06.1993

(30) Priority Data
(31) 4221929 (32) 03.07.1992 (33) DE

(51) INT CL[5]
B65H 5/14 29/00 43/00

(52) UK CL (Edition M)
B8R RAL R651 R661 R711
B6C CWG C1200 C1249
U1S S2238

(56) Documents Cited
None

(58) Field of Search
UK CL (Edition L) B8R RAL
INT CL[5] B65H 5/14 29/00 29/06
ONLINE DATABASES: WPI

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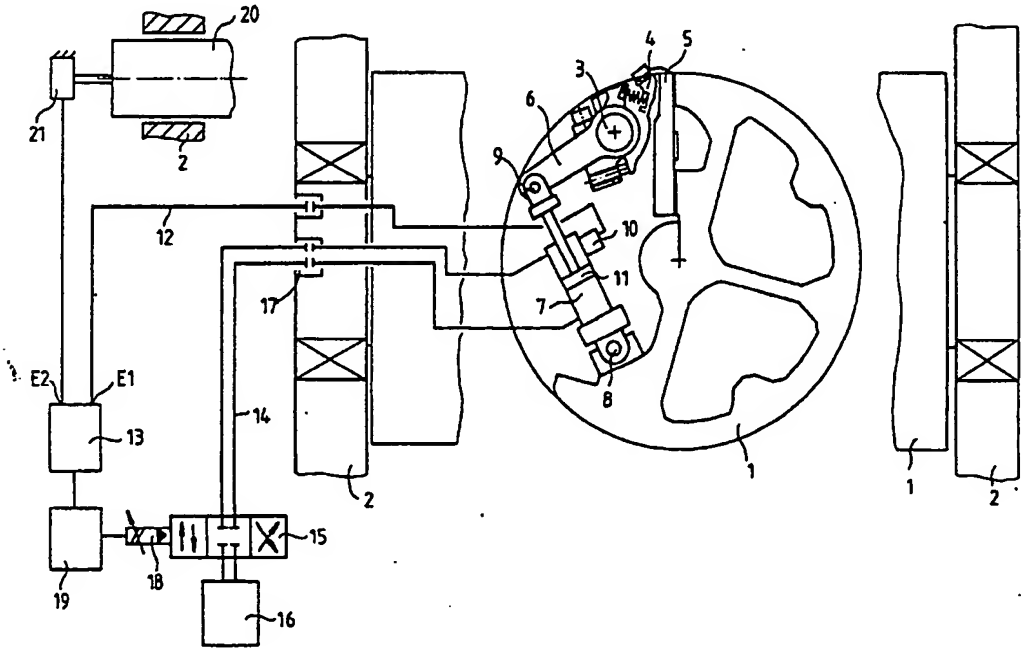
(54) Control for sheet grippers on a sheet-carrying cylinder.

(57) Sheet grippers 4 on a sheet-carrying cylinder 1 or on a comparable component in a printing press, are actuated by a piston-cylinder unit 7, having a system (10) for measuring displacement of the piston. A control system comprises a programmable control computer 13, connected by line 12 to the displacement-measuring system 10 and, in a position-control loop, controlling the motor-actuated positioning of a servo-valve 15 as a function of the position of the piston 11 in the cylinder 7, while allowing for the speed of the printing press and the forces generated by moving masses. The annular position of shaft 20 of cylinder 1 is fed by sensor 21 to the computer 13.



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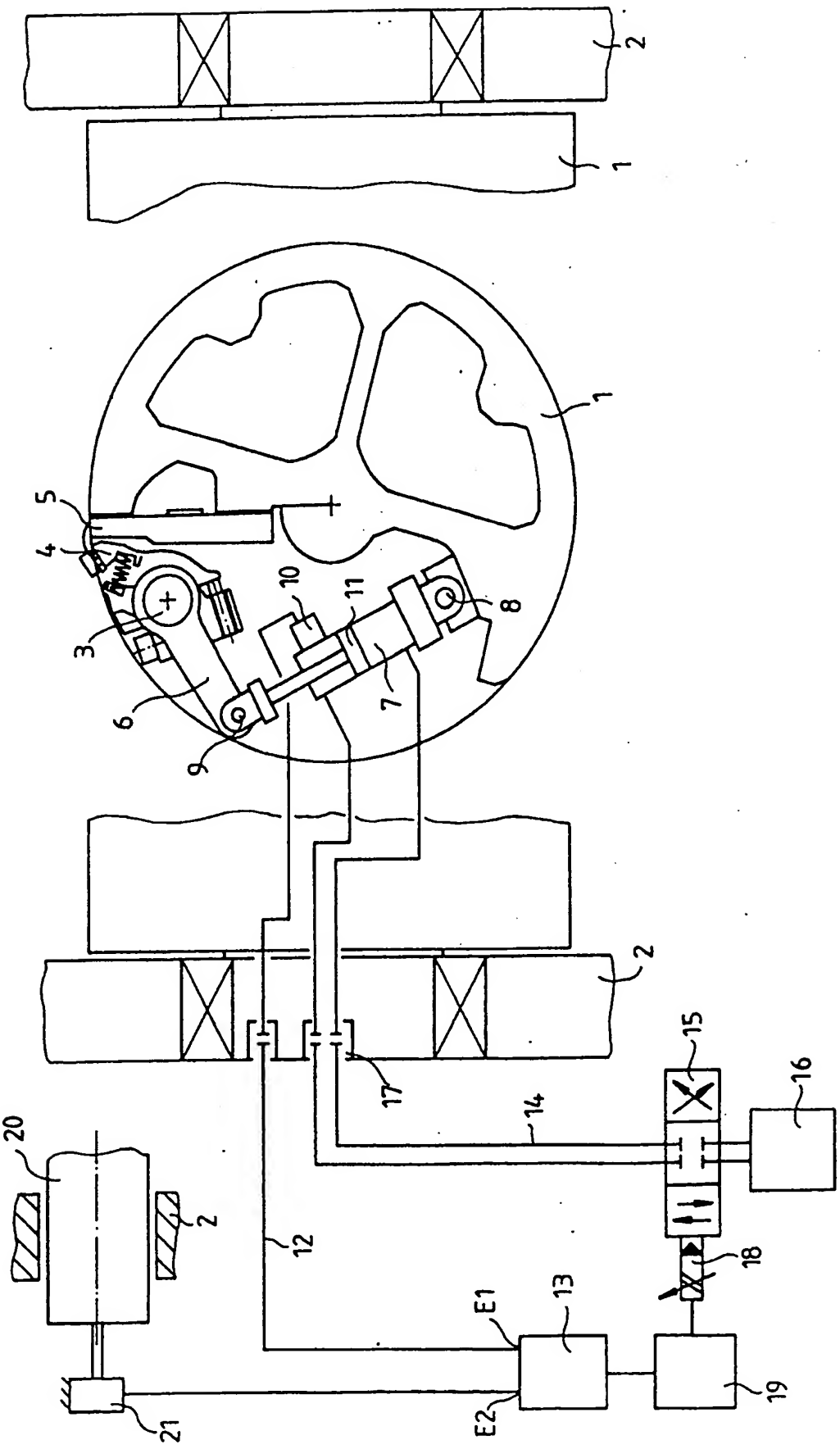
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Gripper control for sheet grippers on a sheet-carrying cylinder or similar in a printing press

The invention relates to a gripper control for sheet grippers on a sheet-carrying cylinder or similar in a printing press according to the defining clause of claim 1.

Such a gripper control is known from DE-OS 23 02 519. A pressure generator (not described in any greater detail in said publication) is connected via a servo-valve (which is adjusted by means of a driven cam plate), through the intermediary of a tube coupling in the form of a rotary connector, to an actuating system for the sheet gripper, said actuating system being disposed on the cylinder and consisting of a diaphragm member, energized by the pressure medium, and of a spring element.

Compared with all-mechanical gripper controls, such a gripper control reduces the moving masses and therefore also the reaction of controlling and inertial forces on the main drive of the printing press. The cam plate allows the rotational-speed-dependent time response of the gripper control to be controlled only to an inadequate degree, unless each conceivable printing-press speed were to be associated with its own cam plate. An adjustable cam plate according to claim 3 of the aforementioned publication would have to comprise a correspondingly elaborate, rotational-speed-dependent

control, the outlay on which does not, however, justify the resultant benefits.

Known from DE-PS 21 13 750 is a magnetically actuatable sheet gripper in which the gripper finger is moved into the closed position by an electromagnet against the force of a spring. Reliable operation for in-register sheet gripping and transfer within a wide rotational-speed range is not possible owing to the rotational-speed-dependent switching delays, which have an effect on the closing of the gripper.

Finally, it is known from DE-AS 11 00 043 to connect the gripper finger of a relatively simple gripper system to an hydraulically or pneumatically operated piston-cylinder unit and to actuate the latter by means of a valve controlled by a cam. Accurate sheet gripping is not provided for with said known arrangement.

The object of the invention is to further develop a gripper control of the initially mentioned kind and to further improve its action through the use of electronic control features.

The object of the invention is achieved by design features according to the characterizing part of claim 1.

As compared with known designs, the advantage consists in the fact that the movement of the gripper can be controlled more flexibly. The computer control makes it possible to make a more accurate allowance for and, above all, to adapt more quickly to changes in operating conditions. The gripper force is controllable by a program preselection and is thus optimally adjustable as

a function of the stock to be printed. The printing press is subjected merely to the force resulting from the inertia of the gripper finger, of the gripper shaft and of the piston in the actuating system. Reactions of gripper bounce on the mounting of the cylinder in the printing press and thus on the printing-press frame are prevented, as a result of which vibrations in the printing press are reduced. Consequently, the features according to the invention make a considerable contribution towards the smoother operation of the printing press and towards a reduction in undesired noises.

Subclaims 2 to 4 contain advantageous design features of the invention.

A specimen embodiment of the invention is shown schematically in the drawing.

A sheet-carrying cylinder 1 is rotatably held in the frame 2 of the printing press. The gripper shaft 3 is held on the cylinder 1 in a channel extending axially in the cylinder 1. Mounted on the gripper shaft 3 is a sheet gripper 4 or, juxtaposed at intervals, a plurality of sheet grippers, which cooperate in known manner with a gripper pad 5 on the cylinder 1. To deflect the gripper shaft 3 for the gripper movement, a lever 6 is mounted on the gripper shaft 3. The actuating system consists of a piston-cylinder unit 7, whose cylinder housing is swivel-connected to the cylinder 1 at point 8 and whose piston rod has an articulated connection, at point 9, to the free end of the lever 6. Said piston-cylinder unit 7 is provided with a displacement-measuring system 10 for detecting the position of the piston 11 in the piston-cylinder unit 7. The piston-

cylinder unit 7 may be disposed inside the cylinder 1 or, alternatively, at an end face of the cylinder 1. The displacement-measuring system 10 is connected, through the intermediary of measuring lines 12 brought out of the cylinder 1 at the end face, to the input E1 of a control computer 13. Connecting lines 14 for a pressure medium connect the two cylinder spaces before and after the piston 11 of the piston-cylinder unit 7 in the cylinder 1 to a pressure generator 16 through the intermediary of a servo-valve 15. Said lines 14, too, are brought out of the cylinder 1 at the end face and comprise a tube coupling 17 in the form of a rotary connector of the same kind provided also, in simplified form, as a current-lead coupling for the measuring line 12. The motor-actuated positioning drive 18 of the servo-valve 15 is controlled by a regulator 19, which is connected electrically to the computer 13 and which acts as a power controller for the positioning drive 18. In order to synchronize the gripper control with the position of the printing press, a main shaft 20 of the printing press, preferably the shaft of the cylinder 1, is provided with an angle-measuring system 21, which supplies a signal proportional to the position of the main shaft to the control computer 13 via the input E2. The control computer 13, the regulator 19, the servo-valve 15, the piston-cylinder unit 7 of the actuating system and of the displacement-measuring system 10 form a position-control loop for the implementation of the gripper movement. The angle-measuring system 21 activates an associated value from the sequence of position setpoint values of the oscillating piston movement (11). The relative standstills of the gripper 4 in relation to the cylinder 1 in the open and closed states are included. The position setpoint values can be computed as a function of rotational speed or can be

taken from a stored table for the respective rotational-speed range. The control computer 13 compares the position of the piston 11, as supplied by the displacement-measuring system 10 on the piston-cylinder unit 7, with the activated position setpoint value. According to the difference, a signal for control of the pressure medium is sent via the regulator 19, acting as the power controller, to the positioning drive 18 of the servo-valve 15, as a result of which the piston 11 and thus the gripper 4 are appropriately moved. Each further signal from the angle-measuring system 21 initiates the retrieval of the following position setpoint value. After the sequence of setpoint values has been executed, the process is restarted with the first value.

It will of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

CLAIMS:

1. A printing press having a gripper control for sheet grippers on a sheet-carrying cylinder or on a comparable component in the press, in which gripper control a stationary pressure generator for a pressure medium is connected, through the intermediary of a motor actuatable servo-valve by means of a coupling, to an actuating system for the sheet gripper, said actuating system being disposed on the cylinder or comparable component and being energizable with the pressure medium through a control system in time with the operation of the printing press, wherein the actuating system consists of a piston-cylinder unit, with a displacement-measuring system provided thereon, said piston-cylinder unit being swivel-connected, at one end, to the cylinder or comparable component and, at the other end, to a lever of the sheet gripper, and wherein the control system comprises a programmable control computer connected by measuring lines to the displacement-measuring system and, in a position-control loop, controlling the motor-actuated positioning of the servo-valve as a function of the position of the piston in the cylinder of the piston-cylinder unit, while allowing for the speed of the printing press and the forces generated by moving masses.

2. A printing press according to claim 1, wherein the control computer is connected to an angle-measuring system disposed on a main shaft of the printing press and being connected electrically to the control computer.

3. A printing press according to claim 2, wherein the main shaft is the shaft of the sheet carrying cylinder.

4. A printing press according to claim 1, 2 or 3 wherein the control computer is connected electrically to a power regulator for the motor-actuated positioning device of the servo-valve, said power regulator being integrated into the position-control loop of the gripper control.

5. A printing press according to any one of claims 1-4 wherein the pressure generator is disposed in the printing press frame.

6. A printing press substantially as hereinbefore described with reference to the accompanying drawings.

7. A gripper control for sheet grippers on a sheet carrying cylinder in a printing press, said gripper control being substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
GB 9313389.0

Relevant Technical fields

(i) UK Cl (Edition L) B8R (RAL)

(ii) Int Cl (Edition 5) B65H 5/14, 29/00, 29/06

Search Examiner

E W BANNISTER

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search

24 SEPTEMBER 1993

Documents considered relevant following a search in respect of claims 1-7

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	None	

Category	Identity of document and relevant passages	Relevant to clair

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

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